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Maine Agricultural Experiment Station

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DECEMBER, 1906.

FOOD INSPECTION.

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This bulletin contains the report upon samples of baking powders, spices and vinegars collected by the inspector.

Requests for bulletins should be addressed to the
AGRICULTURAL EXPERIMENT STATION,
Orono, Maine.

MAINE

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ORONO, MAINE.

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FOOD INSPECTION.

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The law regulating the sale and analysis of foods, enacted by the legislature of Maine in 1905, contemplates two things; the proper and truthful branding of all articles of food, and the exclusion from the markets of deleterious food materials. The law does not seek to prevent the sale of any article of wholesome food, but in case a food material is other than it appears to be, it "shall be plainly labeled, branded or tagged so as to show the exact character thereof." Bulletin 135 of this Station contains the full text of the law and food standards so far as they have been fixed for Maine. Copies of this bulletin may be had on application to the Station.

BAKING POWDERS.

There are practically three classes of baking powders on the market, differing chiefly in the source of the acid:—

Tartrate powders, in which the acid is either cream of tartar (by-tartrate of soda) or tartaric acid.

Phosphate powders, in which calcium or sodium acid phosphate is the acid constituent.

Alum powders, in which the acid constituent is the sulphate of aluminum as it occurs in the various alums.

There are of course many complex baking powders on the market which are made up of mixtures of two or more of the three classes above named. Of these mixtures, phosphate-alum powders are the most common. Indeed, phosphate-alum powders are far more common than straight alum powders.

Whether the acid principle be tartaric acid, calcium phosphate or aluminum sulphate, there is always a residual product which is undesirable as a food. Cream of tartar powders leave a residue of Rochelle salt, the active principle of Seidlitz powders; tartaric acid powders leave a residue of sodium tartrate; phosphate powders leave a residue of sodium and calcium phosphates; and alum powders leave a residue of ammonium, potassium or sodium sulphate, in accordance with the kind of alum

used. The residues of the phosphate-alum powders differ somewhat from those of either alum or phosphate powders and vary with the proportion of the different acid constituents used. When the ingredients are properly proportioned in the baking powder, neither alum or alum phosphate powders leave any considerable amount of alum in the resulting bread or cake.

There is a great dispute as to which of these different residues are the least objectionable. The food law of this State does not attempt to in any way answer the question as to which is best. They are all put on the same footing of correctly stating the source of the acid constituent. A baking powder is adulterated under the law only when the label does not truthfully name the kind of acid salt it contains; when it is falsely labeled in any particular; or when it contains useless, inert foreign matter, mineral or otherwise.

The per cent of available carbonic acid gas furnished by the different classes of baking powders is, according to Wiley,* as follows:

Cream of tartar baking powder, 12 per cent available carbonic acid gas.

Phosphate baking powder, 13.0 per cent available carbonic acid gas.

Alum baking powder, 8.1 per cent available carbonic acid gas.

Phosphate-alum powder, 10.4 per cent available carbonic gas.

The alum powders would require a half more than the tartrate or phosphate powders to produce the same leavening effect. There are however very few straight alum powders on the market. Because of the greater leavening effect of the mixed powders and the supposed less harmful residues, nearly all the alum now used is in the phosphate-alum powders.

The samples here collected and reported upon have not been tested for strength, but merely for correctness of labeling. Many of the less common brands were found by correspondence with the manufacturers to be three or more years old. Naturally such powders would not be nearly as effective leavening agents as when they were fresher.

A description of the brands collected, the cost of the powders, and comments follow.

*The figures are quoted from Bul. 13 of Div. of Chemistry, U. S. Dept. of Agr.

The brand, maker, dealer, cost, and character of baking powders examined.

CREAM OF TARTAR AND TARTARIC ACID POWDERS.

7464. *Cleveland Superior Baking Powder*, made by Cleveland Baking Powder Company, New York. Purchased from John Dingley Co., Auburn. In half pound tin. Price per can 25 cents. Cost per ounce 3.2 cents. Guaranteed cream of tartar and bicarbonate of soda. The acid salt is correctly named.

7467. *Cream Baking Powder*, made by Price Baking Powder Co., N. Y. and Chicago. Purchased from Merrill & Crowell, Lewiston. In half pound tin. Price per can 25 cents. Cost per ounce 3.8 cents. Guaranteed cream of tartar; no alum, ammonia, lime or other adulterants. The acid salt is correctly named.

7475. *John Alden Baking Powder*, made by W. L. Wilson & Co., Portland. Purchased from manufacturer. In one pound tin. Price per can 45 cents. Cost per ounce 3.0 cents. Guaranteed cream of tartar, tartaric acid, and bicarbonate of soda. The acid salts are correctly named.

7476. *King Arthur Baking Powder*, made by Neally & Miller, Lewiston. Purchased from manufacturer. In half pound tin. Guaranteed cream of tartar, tartaric acid and bicarbonate of soda. The acid salts are correctly named.

7471. *Plume Baking Powder*, made by Plume Baking Powder Co., Malden, Mass. Purchased from W. L. Wilson Co., Portland. In pound tin. Price per can 40 cents. Cost per ounce 3.7 cents. Guaranteed cream of tartar starch and bicarbonate of soda. The acid salt is correctly named.

7470. *Schilling's Best Baking Powder*, made by A. Schilling & Co., San Francisco, Cal. Purchased from F. H. Verrill, Portland. In pound tin. Price per pound 45 cents. Cost per ounce 2.7 cents. The acid salt was not named on the label. The manufacturer stated that these were old goods and that all goods now sent out are labeled cream of tartar baking powder. Acid salt is as claimed.

7474. *Shaw's Baking Powder*, made by Geo. C. Shaw & Co., Portland. Purchased from manufacturer. In one pound tin. Price per can 43 cents. Cost per ounce 2.8 cents. Guaranteed a high grade cream of tartar baking powder, free from starch, alum phosphate, lime sulphate or chlorides. The acid salt is correctly named.

ACID PHOSPHATE POWDERS.

7465. *Davis's O. K. Baking Powder*, made by R. B. Davis, N. Y. Purchased from Dunn & Ross, Auburn. In half pound tin. Price per can 20 cents. Cost per ounce 2.1 cents. Guaranteed acid phosphate, starch and bicarbonate of soda. The acid salt is correctly named.

7469. *Horsford's Self Raising Bread Preparation*, made by Rumford Chemical Works, Providence, R. I. Purchased from C. H. Cloutier, Lewiston. In half pound paper package. Price per package 25 cents. Cost per ounce 2.2 cents. Guaranteed acid phosphate, starch and bicarbonate of soda. The acid salt is correctly named.

7463. *Rumford's Baking Powder*, made by Rumford Chemical Works, Providence, R. I. Purchased from John Dingley Co., Auburn. In half pound tin. Price per can 15 cents. Cost per ounce 1.8 cents. Guaranteed strictly pure phosphate powder. The acid salt is correctly named.

ALUM POWDER.

7472. *Bon Bon Baking Powder*, made by J. C. Grant Chemical Co., East St. Louis. Purchased from Biddeford Grocery Co., Biddeford. In one pound tin. Price per can 12 cents. Cost per ounce .07 cents. Guaranteed double sulphate of aluminum, starch and bicarbonate of soda. The claim that it is an alum powder is correct.

TARTRATE-ALUM POWDER.

7477. *Ocean Baking Powder*, made by Ocean Mill, Montreal, P. Q. Purchased from Alex Quirion, Waterville. In quarter pound tin. Price per can 10 cents. Cost per ounce 2.2 cents. These were old goods and carried no guarantee. They have been withdrawn from market. Both tartaric acid and alum were found in the goods.

ACID PHOSPHATE-ALUM POWDER.

7473. *Biskit Baking Powder*, made by the Biskit Baking Powder Company, Boston. Purchased from J. O. Sullivan, Biddeford. In quarter pound tin. Price per can 10 cents. Cost per ounce 2.3 cents. Guaranteed acid calcium phosphate, alum, starch and bicarbonate of soda. The acid salts are correctly named.

TARTRATE-ALUM-ACID PHOSPHATE POWDER.

7466. *Grand Union Baking Powder*, made by the Grand Union Tea Co., Brooklyn, N. Y. Purchased from Grand Union Tea Co., Lewiston. In one pound tin. Price per can 50 cents. Cost per ounce 3 cents. The label states that the baking powder contains cream of tartar, acid phosphate, alum, starch and bicarbonate of soda. The acid salts are correctly named.

7468. *I. C. Baking Powder*, made by Jacques Mfg. Co., Chicago, New York and Kansas City. Purchased from C. H. Cloutier, Lewiston. In 10-ounce tin. Price per can 10 cents. Cost per ounce 0.9 cents. These are old goods and the dealer stated that he would procure the proper labels. A year ago the manufacturer said that the label now used stated that the powder consists of calcium acid phosphate and basic aluminum sulphate. In addition to alum and acid phosphate, the sample here examined carried tartaric acid.

SPICES.

Spices are vegetable materials which depend for their use upon the pungency which they possess to give flavor or relish to food. As such they are of considerable importance dietetically, but from the fact that they are used in such small amounts, they have actually little nutritive value. Spices are, however, of great interest to the public because of all food materials, they are more susceptible than other classes to fraudulent adulteration of the more skilled variety. In many cases not only the general appearance and taste of the skillful adulterated article are made to counterfeit the genuine spices, but even the microscopical appearance is intended to deceive. It is very rare that the microscope fails to detect the presence of any foreign substance in spice and hence its use is indispensable and in some respects more important than chemistry in the examination of spices. In most cases, however, both the microscopical and chemical determinations are necessary that the information given by one method may supplement that of the other.

The two most important chemical determinations are ash and ether extract. The microscope will betray even the presence or traces of foreign substances and of course such traces are liable to be present in the most carefully manufactured goods. Most manufacturers use the same mill for grinding different

spices, hence in an imperfectly cleaned mill, a trace of the spice last ground is liable to be carried to that which is being ground. The mechanical purification of the spices before they are ground, frequently presents such difficulties that even the unground spices are not strictly pure.

The samples of spices collected by the Station inspector, have been subjected to both chemical and microscopical examination. For the very full and careful microscopical examination, we are indebted to the experts of the Bureau of Chemistry of the U. S. Department of Agriculture at Washington. The chemical examinations were made in the Station laboratory.

Probably in no class of products is there greater variation in quality, than in commercial spices. A spice may be perfectly pure, so far as freedom from adulteration is concerned, and still be markedly inferior in quality. Furthermore the age of a spice and particularly the length of time that it has been powdered and the kind of a package in which it has been kept has much to do with the strength of spices. On reference to the standards adopted for Maine * the wide latitude that has to be given in composition even to pure spices is indicated.

The best way for the retailer to insure good quality is to buy of firms who purchase only the best grades of whole spices and powder them in their own mills. The consumer is best protected by buying the best from reliable retailers. The price paid per pound will usually be a guide to quality. A specially low priced spice must of necessity be either inferior in quality or adulterated.

A discussion of the different kinds of spices examined showing the results of the chemical and microscopical examinations follow.

ALLSPICE OR PIMENTO.

Allspice is the dried fruit of *Eugenia pimenta*, an evergreen tree belonging to the same family as the clove. It is indigenous in the West Indies and is especially cultivated in Jamaica. The berries are grayish or reddish brown in color; they are gathered when they have attained their largest size, but before becoming fully ripe. Though considerably less pungent than other spices, it possesses an aroma not unlike cloves and cassia.

* Bulletin 135, Maine Agricultural Experiment Station, pages 241-243.

While the samples of pimento differed very materially in quality, all of the samples but one were genuine. The Golden Crown allspice (No. 7196), made by the Boston Supply Co., was largely adulterated with what seems to be under the microscope roasted pea flour. It is possible that the trace of red pepper found was added to this sample, as well as that of No. 7202, for the purpose of giving apparent strength. The excessive amount of starch and the low ether extract in sample No. 7196 are explained by the addition of the roasted pea flour.

The analysis of the different brands of allspice are given on pages 262-263.

CASSIA AND CINNAMON.

The names cassia and cinnamon are used interchangeably in commerce though strictly speaking they represent two distinct species of a genus belonging to the laurel family. In the food standards, little attempt is made to distinguish between cassia and cinnamon. The best quality of cinnamon is the bark of *Cinnamomum zeylanicum*, a tree from 20 to 30 feet high, native to the island of Ceylon, cultivated in some parts of tropical Asia, Sumatra, and Java. The entire yield of pure Ceylon cinnamon is extremely small and but little of it comes to America. The cheaper and more common cassia is the bark of *Cinnamomum cassia* which comes from China and India. It is darker in color than true cinnamon bark, of coarser texture and thicker. Both cinnamon and cassia barks are very aromatic in taste, somewhat astringent and slightly sweet.

Cassia buds are the dry flour buds of China cassia and are in the market both in whole and powder form. The powdered cassia or cinnamon of commerce consists of a mixture of several varieties of bark, and the cheaper grades contain an admixture of the ground buds.

The samples examined were genuine, with the exception that some of them contained traces of foreign matter, either wood tissue or of some other spice. These traces are probably accidental and not purposely added. There was, however, a great difference in the pungency of the different samples, which is due either to the quality of the whole cinnamon used, or to the length of time since grinding.

The analysis of the different brands of cinnamon are given on pages 262-265.

CLOVES.

Cloves are the dried flower buds of the clove tree *Caryophyllus aromaticus*, which belongs to the Myrtle family, as also does the Allspice. The tree is an evergreen from 20 to 40 feet in height, and is cultivated extensively in Brazil, the West Indies, India and Zanzibar. The green buds in the process of growth, change to a reddish color, at which stage they are removed from the tree, spread out in the sun and allowed to dry, the color changing to the familiar deep brown of the cloves of commerce. One of the most valuable ingredients of the clove is the volatile clove oil. The ground cloves of commerce are liable to be deficient in clove oil because when exposed to the air, it gradually disappears. As there is a great demand for oil of cloves, it gives the temptation to partially extract the oil from the ground cloves of commerce. Furthermore, as there will always be more or less of the stems with the clove buds even pure ground cloves will frequently contain some of the stem. In most of the samples here examined, clove stems were present from traces to a large amount. Only in two samples, Nos. 7215 and 7217 did there seem to be a particularly unusual large amount of clove stems. Other than clove stems, no adulterant was found in the cloves examined. The different samples, however, differ considerably in quality, which may have been due to age or partial exhaustion of the cloves.

The analysis of the different brands of ground cloves examined are given on pages 264-267.

GINGER.

Ginger is the washed and dried, or decorticated (scraped) and dried root stalk of *Zinziber zingiber*, an annual herb growing to a height of from 3 to 4 feet. It is a native of India and China, but is quite extensively cultivated in tropical America, Africa and Australia. The root is dug when the plant is a year old and when the stem has withered. If when freshly dug and scalded to prevent sprouting, it is dried at once, it forms the so-called black ginger of commerce. When decorticated it furnishes what is known in commerce as white ginger. The best variety of white ginger is Jamaica ginger. The scraped root is sometimes bleached to make it still whiter, or may be sprinkled with carbonate of lime. The light colored decorticated ginger is usually selected for grinding.

There are two kinds of exhausted ginger commercially available for admixture as an adulterant. One is the product left after the extraction with strong alcohol, in the making of extract of Jamaica ginger; and the other the residue from extraction with either dilute alcohol or with water in the manufacture of ginger ale. It is rarely substituted wholly for the pure variety because the lack of pungency would make the adulteration too evident. It is used to mix with unexhausted ginger in varying proportions, and is also used as an adulterant for other spices. It is to its volatile oil that ginger is indebted for most of its aromatic qualities. So far as ginger was concerned, all of the samples examined were genuine, but a number of the samples, notably Nos. 7165, 7170, 7171, 7173 and 7174 were weak to the taste as if exhausted ginger had been added. This, however, may have been due to the long keeping of the ground goods in paper.

The analysis of the different brands of ground ginger examined are given on pages 266-269.

MACE.

Both nutmeg and mace occur in the fruit of several varieties of myrtle trees. The nutmeg tree is a native of the Malay Archipelago and grows from 20 to 30 feet high, somewhat resembling an orange tree in appearance. The crimson colored aril that surrounds the nutmeg kernel has many narrow flattened lobes. In the process of drying to form the mace of commerce, it loses its brilliant red color and turns a yellowish brown. Bombay mace is almost devoid of odor and even though it is a variety of mace, should be considered as an adulterant from its lack of pungency. Because of the high price of mace, there is particular temptation for adulterating it. Five of the samples of mace examined were strictly pure. Three contained traces of ginger. One was adulterated with corn meal, and two adulterated with Bombay mace. Where a large amount of Bombay mace was used, nutmeg was added to bring up the flavor. In purchasing ground mace, care should be taken to purchase that from reputable spice mills.

The analyses of the different brands of powdered mace examined are given on pages 268-269.

MUSTARD.

There are a large number of species of mustard, but mustard seed of commerce should be either the white mustard, *Sinapis alba*, or black or brown mustard, *Brassica nigra*, or *Brassica juncea*. As there are a large number of wild mustards which infest mustard as well as other fields, it frequently is well nigh a mechanical impossibility to obtain a mustard seed free from wild mustard. Many of the mustards collected by the Station contain the ground seeds of *Brassica arvensis*.*

Ground mustard as defined by the food standards, is a powder made from mustard seed with or without the removal of the hulls and a portion of the fixed oil. There was formerly a more or less prevalent idea that pure mustard would lump unless starch or flour were mixed with it. In the case of 4 of the samples examined, foreign starches were present in more or less quantities. These were probably not added in the ordinary sense of adulteration but to prevent caking.

Sample No. 7081 was labeled as a compound mustard which explains the presence of the legumes and wheat flour. Three of the samples carried more or less turmeric. While turmeric possesses some value as a condiment in itself, it being, for instance, the chief ingredient in curry powder, it is added to mustard merely to improve the color. While under the Maine Pure Food law its use would be admissable if its presence is stated upon the label, its presence unnoted is an adulteration.

The analyses of the different brands of mustard examined are given on pages 270-271.

BLACK AND WHITE PEPPER.

Black pepper is the dried immature berry of the pepper plant, *Piper nigrum*, a climbing shrub growing to the height of 12 to 20 feet; a native of the East Indies but cultivated in many tropical countries. When the fruit begins to turn red, it is gathered and dried. In this process, it turns black and shrivels up, forming the black peppercorns of commerce.

White pepper is obtained by decorticating (removing hulls or shells) the fully ripened black peppercorns. The pepper hulls

*The seed is thus identified by the Bureau of Chemistry, but is probably the same as *Brassica campestris*.

or shells obtained in making white pepper out of black are very largely used as an adulterant for black pepper and to some extent for spices. Many of the samples of black pepper here reported seem to carry too large an amount of pepper shells or hulls. Of course it is difficult under the microscope to make a quantitative examination of such materials, but it is doubtful if in the case of all the samples indicated as containing an excess of pepper hulls, that they were added fraudulently. As is well known the quality of pepper deteriorates rapidly on exposure to the air and the loss of strength of some of the peppers here reported may have been due to age. For the most part, the white peppers seemed to be genuine although 3 of the samples carried more pepper hulls than should be present. From its process of manufacture, white pepper should be practically free from hulls.

The analysis of the different brands of grade pepper examined are given on pages 272-275.

CAYENNE OR RED PEPPER.

Cayenne pepper is the dried fruit of several species of *Capsicum*, a genus of the nightshade family, native of the American tropics but now cultivated in nearly all warm countries. The ordinary garden species of red pepper is *Capsicum annuum* of which there are over 30 varieties in cultivation in this country. The Cayenne and Chili varieties are most highly priced because of their pungency. While differing greatly in flavor, partly due to age and partly to the species of *Capsicum* from which they were made, all of the samples of ground red or cayenne pepper were genuine.

The analysis of the different brands of red peppers examined are given on pages 274-275.

Brand.	Manufacturer.	Dealer and town.	Price paid.	Weight of contents.	Station number.
ALLSPICE OR PIMENTO.			cts.	lbs.	
Slade's.	D. & L. Slade Co., Boston, Mass.	James H. Snow & Co., Bangor.....	8	.23	7190
Slade's allspice.	D. & L. Slade & Co., Boston, Mass.	John B. Johnson, Portland.....	7	.23	7191
Premier Jamaica.	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor.....	10	.25	7192
Pimento.	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor.....	8	.22	7193
Allspice.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Bangor, Maine.....	10	.17	7194
Allspice.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Portland.....	10	.18	7195
Golden Crown.	Boston Supply Co., Boston, Mass.	W. J. Eldridge, Foxcroft.....	6	.24	7196
Shaw's pimento.	Dwinell, Wright & Co., Boston, Mass.	Geo. C. Shaw & Co., Portland.....	8	.25	7197
Three Crow brand.	John Bird Co., Rockland.	Lewiston Tea & Coffee Co., Lewiston.....	6	.23	7198
Pimento.	Stickney & Poor, Boston, Mass.	W. L. Wilson Co., Portland.....	8	.27	7199
Choicest allspice.	A. Colburn Co., Philadelphia, Pa.	Brennan & Curran, Bangor.....	7	.26	7200
Royal Brand pimento.	Dwinell, Wright Co. Boston, Mass.	W. P. Stewart & Co., Waterville.....	6	.24	7201
Hatchet Jamaica allspice.	Twitchell-Champlin Co., Portland and Boston.	F. H. Verrill, Portland.....	8	.23	7202
Premier allspice.	Francis H. Leggitt & Co., New York.	James H. Snow & Co., Bangor.....	8	.26	7203
Slade's allspice in bulk.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor.....			7204
Pimento in bulk.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland.....			7205
CASSIA AND CINNAMON.					
Slade's.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor.....	5	.24	7221
Slade's.	D. & L. Slade Co., Boston, Mass.	John B. Johnson, Portland.....	7	.24	7222
Three Crow brand.	John Bird Co., Rockland.	Lewiston Tea & Coffee Co., Lewiston....	6	.25	7223

Station number.	ASH.		Crude fiber.	Starch.	ETHER EXTRACT.		Foreign matters found.
	Total.	Insoluble in HCl.			Volatile.	Non-volatile.	
	%	%	%	%	%	%	
7190	4.53	.87	24.93	13.77	3.70	4.00	None.
7191	4.48	.49	24.55	12.69	3.70	3.75	None.
7192	4.62	.49	23.15	15.66	3.65	3.31	None.
7193	5.42	.35	20.05	16.47	2.63	4.60	None.
7194	4.63	.05	22.18	16.74	3.55	5.05	None.
7195	4.98	.10	26.20	16.20	4.40	3.10	None.
7196	5.08	.93	12.78	28.08	2.58	2.77	A leguminous product, apparently roasted pea flour. Trace of red pepper.
7197	4.45	.10	21.93	17.82	4.30	4.86	Trace of ginger.
7198	4.75	.05	22.28	16.47	3.55	2.23	None.
7199	4.65	.13	23.53	14.03	4.30	4.14	None.
7200	4.13	.10	24.75	16.20	2.43	3.67	None.
7201	4.96	.10	23.68	15.12	3.45	4.25	None.
7202	4.53	.05	23.83	16.20	4.25	3.75	Trace of red pepper.
7203	4.58	.13	24.85	17.55	2.85	3.65	None.
7204	4.65	.16	21.20	16.47	3.30	4.13	None.
7205	4.69	.05	22.33	16.74	4.08	2.65	None.
7221	2.55	.10	23.00	20.05	0.95	1.28	Trace wood tissue.
7222	3.49	.70	23.03	17.00	1.00	1.23	Trace wood tissue.
7223	3.33	.70	22.35	21.33	1.13	1.17	Trace foreign starches.

Brand.	Manufacturer.	Dealer and town.	Price paid.	Weight of contents.	Station number.*
CASSIA AND CINNAMON.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Bangor.....	10	.21	7224
	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Portland	10	.120	7225
Premier Ceylon.	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor.....	12	.126	7226
Cassia.	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor.....	8	.23	7227
Premier brand.	Francis H. Leggett & Co., New York.	James H. Snow & Co., Bangor.....	8	.25	7228
Royal brand cassia.	Dwinell, Wright & Co., Boston, Mass.	W. P. Steward & Co., Waterville	7	.25	7229
Hatchet brand Batavia cassia.	Twitchell-Champlin Co., Portland, and Boston, Mass.	F. H. Verrill, Portland	8	.23	7230
Cassia.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland	10	.25	7231
Cassia.	S. S. Pierce Co., Boston, Mass.	James H. Snow & Co., Bangor.....	25	.25	7232
Colburn's choicest cinnamon.	A. Colburn Co., Philadelphia, Pa.	Brennan & Curran, Bangor.....	7	.25	7233
Shaw's cassia.	Dwinell, Wright Co., Boston, Mass.	Geo. C. Shaw Co., Portland	8	.26	7234
Bulk cinnamon.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland			7235
Bulk cinnamon.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor.....			7236
Bulk cinnamon.	Bennett & Simpson.	Wm. Milliken & Co., Portland			7237
CLOVES.					
Ground cloves.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor.....	5	.24	7206
Premier Amboyna cloves.	Stickney & Poor, Boston, Mass.	F. T. Hall & Co., Bangor.....	10	.34	7207
Cloves.	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor.....	8	.24	7208
Cloves.	Stickney & Poor, Boston, Mass.	John B. Johnson, Portland	7	.25	7209
Cloves.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Bangor	10	.19	7210

Station number.	ASH.		Crude fiber.	Starch.	ETHER EXTRACT.		Foreign matter found.
	Total.	Insoluble in HCl.			Volatile.	Non-volatile.	
	%	%	%	%	%	%	
7224	3.44		20.30	17.28	1.30	1.08	None.
7225	4.04	.70	21.28	17.00	0.95	1.15	Trace ginger and wood tissue.
7226	3.90	.25	21.18	19.98	1.88	1.00	Trace allspice.
7227	4.00	.48	21.80	16.47	0.80	0.95	Trace wood tissue.
7228	4.96	.70	22.58	20.38	0.60	0.95	None.
7229	2.90	.45	23.35	25.65	0.80	0.95	None.
7230	3.70	.35	21.40	18.63	1.05	0.83	Trace wood tissue.
7231	3.90	.43	21.88	18.63	0.98	0.97	None.
7232	4.35	.03	18.83	19.17	1.78	1.27	None.
7233	3.02	.65	23.75	22.68	0.88	1.22	Trace wood tissue.
7234	2.66	.45	23.00	25.38	0.83	1.25	None.
7235	3.15	.55	22.35	21.33	0.90	1.30	None.
7236	4.85	.58	13.75	12.96	1.83	4.57	Trace red pepper.
7237	4.56	.17	21.08	18.63	0.93	1.40	None.
7206	6.58	.63	9.53	5.80	15.47	7.52	Trace clove stems.
7207	6.60	.08	8.48	7.25	15.55	7.30	None.
7208	6.92	.35	9.68	6.52	13.49	5.92	Some clove stems.
7209	6.58	.05	9.98	8.41	12.52	6.13	Some clove stems.
7210	6.48	.63	7.93	6.38	18.09	6.65	None.

Brand.	Manufacturer.	Dealer and town.	Price paid.	Weight of contents.	Station number.
			cts.	lbs.	
Cloves.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Portland	10	.19	7211
Ground cloves.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland	8	.25	7212
Shaw's cloves.	Dwinell, Wright Co., Boston, Mass.	Geo. C. Shaw & Co., Portland	8	.24	7213
Colburn's choicest cloves.	A. Colburn Co., Philadelphia, Pa.	Brennan & Curran, Bangor	7	.25	7214
Three Crow brand.	John Bird Co., Rockland.	Lewiston Tea and Coffee Co., Lewiston	6	.24	7215
Hatchet brand Amboyna.	Twitchell-Champlin Co., Portland and Boston, Mass.	F. H. Verrill, Portland	8	.24	7216
Royal brand.	Dwinell, Wright Co., Boston, Mass.	W. P. Stewart & Co., Waterville	7	.23	7217
Premier brand.	Francis H. Leggett & Co., New York.	James H. Snow & Co., Bangor	10	.25	7218
Bulk cloves.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor			7219
Bulk cloves.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland			7220
GROUND GINGER.					
Three Crow brand.	John Bird Co., Rockland.	Atwood Market Co., Lewiston	6	.24	7161
Ginger.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Bangor	10	.17	7162
Ginger.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Portland	10	.19	7163
Premier Borneo.	Stickney & Poor, Boston, Mass.	F. T. Hall & Co., Bangor	10	.28	7164
Ginger.	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor	8	.25	7165
African ginger.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor	5	.25	7166
Slades' ginger.	D. & L. Slade Co., Boston, Mass.	John B. Johnson, Portland	7	.25	7167
Ginger.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland	6	.24	7168
Ginger.	Stickney & Poor,* Boston, Mass.	Great China and Pacific Tea Co., Bangor	5	.25	7169

* Put up for the Great China and Pacific Tea Company.

Station number.	ASH.		Crude fiber.	Starch.	ETHER EXTRACT.		Foreign matters found.
	Total.	Insoluble in HCl.			Volatile.	Non-volatile.	
	%	%	%	%	%	%	
7211	6.86	.65	8.58	6.96	17.66	6.64	Some clove stems.
7212	5.88	.48	9.45	7.25	17.40	5.73	Some clove stems.
7213	7.14	.48	9.53	5.80	15.79	5.99	Some clove stems.
7214	6.89	.50	14.38	7.25	11.90	5.95	Trace clove stems.
7215	7.75	.30	12.45	7.54	8.04	5.98	Largely clove stems.
7216	6.90	.43	10.03	7.54	13.65	6.00	Some clove stems.
7217	6.70	.45	9.50	7.25	15.84	6.32	A large proportion of clove stems.
7218	7.58	.83	10.88	7.83	14.52	7.11	Some clove stems.
7219	7.32	.33	11.33	6.38	12.85	6.69	Some clove stems.
7220	7.20	.30	10.88	6.00	11.03	8.35	Some clove stems.
7161	5.00	.50	4.90	49.60	2.00	4.73	None.
7162	5.85	.55	5.90	49.60	3.30	4.35	None.
7163	5.85	.15	5.40	52.60	3.28	4.12	None.
7164	4.50	.50	4.20	55.62	2.60	3.30	None.
7165	7.25	2.43	5.90	48.50	1.58	3.52	None.
7166	6.48	1.80	6.15	47.68	2.43	3.55	None.
7167	6.45	1.60	6.30	47.95	2.90	3.30	None.
7168	6.45	1.80	5.43	48.75	3.10	3.45	None.
7169	8.10	3.13	5.98	45.75	1.25	3.39	None.*

* Taste weak as if exhausted ginger was used.

Brand.	Manufacturer.	Dealer and town.	Price paid.	Weight of contents.	Station number.
GINGER.			cts.	lbs.	
Royal brand.	Dwinell, Wright Co., Boston, Mass.	W. P. Stewart & Co., Waterville.....	6	.26	7170
Jamaica ginger.	S. S. Pierce Co., Boston, Mass.	James H. Snow & Co., Bangor.....	15	.30	7171
Hatchet brand African.	Twitchell-Champlin Co., Portland and Boston, Mas.	F. H. Verrill, Portland.....	8	.23	7172
Premium brand.	Francis H. Leggitt & Co., New York, N.Y.	James H. Snow & Co., Bangor.....	10	.20	7173
Colburn's ginger.	C. Colburn & Co., Philadelphia, Pa.	Brennan & Curran, Bangor.....	7	.25	7174
Bulk Jamaica ginger.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor.....			7175
Bulk ginger.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland.....			7176
Bulk giuger.	Bennett & Simpson,	Wm. Milliken & Co., Portland.....			7177
GROUND MACE.					
Bulk mace.	.....	Grand Union Tea Co., Bangor.....			7178
Bulk mace.	Bennett, Simpson & Peep, London, Eng.	James H. Snow & Co., Bangor.....			7179
Bulk mace.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland.....			7180
Durkee's mace.	E. R. Durkee & Co.,	James H. Snow & Co., Bangor.....	10	.06	7181
Premium.	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor.....	10	.06	7182
Premium.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland.....	10	.07	7183
Slade's mace.	D. & L. Slade Co., Boston, Mass.	John B. Johnson, Portland.....	8	.06	7184
Colburn's mace.	A. Colburn & Co., Philadelphia, Pa.	Brennan & Curran, Bangor.....	10	.07	7185
Slade's mace.	S. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor.....	10	.06	7186
Shaw's mace.	Dwinell, Wright Co., Boston, Mass.	Geo. C. Shaw Co., Portland.....	18	.09	7187
Hatchet brand.	Twitchell-Champlin Co., Portland and Boston, Mass.	W. S. Ham, Foxcroft.....	8	.05	7188
Royal brand.	Dwinell, Wright Co., Boston, Mass.	W. P. Stewart & Co., Waterville.....	16	.09	7189

Station number.	ASH.		Crude fiber.	Starch.	ETHER EXTRACT.		Foreign matters found.
	Total.	Insoluble in HCl.			Volatile.	Non-volatile.	
	%	%	%	%	%	%	
7170	7.03	1.80	5.98	52.88	1.50	3.35	None.
7171	4.18	.25	2.75	57.27	1.68	2.57	None.
7172	5.13	.58	5.20	54.54	2.53	5.25	None.
7173	4.83	.65	4.40	57.26	1.85	4.60	None.
7174	5.38	1.80	3.75	61.66	1.00	2.80	None.*
7175	5.65	.80	5.48	55.08	2.15	4.48	Apparently not scraped and bleached.
7176	5.60	1.20	5.73	51.78	2.13	4.52	None.
7177	4.33	.33	4.03	57.28	2.98	2.87	None.
7178	3.46	.98	4.45	30.65	4.55	24.90	Trace of ginger.
7179	3.65	.40	4.98	22.55	6.75	31.41	Bombay mace.
7180	3.60	.47	6.08	21.87	6.05	27.50	None.
7181	4.13	1.22	4.50	29.70	3.50	27.78	None.
7182	3.65	2.95	6.20	20.79	5.09	29.66	None.
7183	3.60	.44	5.83	20.52	4.00	31.69	None.
7184	2.79	.43	3.68	29.15	7.67	27.65	None.
7185	2.90	.43	3.73	33.70	5.49	23.38	Corn meal Trace ginger.
7186	3.42	.45	5.03	25.10	8.03	26.74	Small amount nutmeg.
7187	2.50	.30	3.73	28.62	5.69	25.99	Trace ginger.
7188	2.42	.35	6.30	17.01	2.28	50.59	Largely Bombay mace, a little nutmeg.
7189	2.33	.28	4.03	21.05	5.61	31.55	Trace ginger.

* Taste weak as if exhausted ginger was used.

Brand.	Manufacturer.	Dealer and town.	Price paid.	Weight of contents.	Station number.
			cts.	lbs.	
MUSTARD.					
Purity brand.	Manufacturer not given.	James H. Snow & Co., Bangor.....	20	.51	7080
Keene's mustard.	Manufactured in England.	Fred T. Hall & Co., Bangor... ..	20	.23	7081
Keene's mustard.	Manufactured in England.	James H. Snow & Co., Bangor.....	20	.24	7082
Colburn's mustard.	Manufacturer not given.	Fred T. Hall & Co., Bangor.....	10	.26	7083
Premium mustard.	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor.....	10	.26	7084
Mustard.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland.....	10	.27	7085
Barrus mustard.	Manufacturer not given.	Wm. Scott, Bangor.....	10	.29	7086
Double superfine.	Firth, Cole & Co., London, Eng.	Fisher & Crocker Co., Bangor.....	10	.24	7087
Extra English.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor.....	10	.25	7088
Slade's Oxford.	D. & L. Slade Co., Boston, Mass.	A. J. McNaughton, Foxcroft.....	10	.26	7089
English Durham.	Atkinson & Jones, London, Eng.	W. S. Ham, Foxcroft.....	5	.18	7090
Royal.	Dwinell, Wright & Co., Boston, Mass.	W. P. Stewart & Co., Waterville.....	17	.55	7091
Bennett's.	Bennett, Simpson & Peep, London, Eng	W. L. Wilson & Co., Portland, Maine.....	10	.24	7092
Mustard.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Bangor.....	10	.21	7093
Mustard.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Portland.....	10	.25	7094
BLACK PEPPER.					
Pepper.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Bangor.....	10	.18	7123
Pepper.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Portland.....	10	.21	7124
Colburn's pepper.	A. Colburn Co., Philadelphia, Pa.	Brennan & Curran, Bangor.....	7	.24	7125
Slade's pepper.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor... ..	5	.24	7126

Station number.	A.S.H.		Crude fiber.	Starch	ETHER EXTRACT.		Foreign matters found.
	Total.	Insoluble in HCl.			Volatile.	Non-volatile.	
	%	%	%	%	%	%	
7080	13.02	.82	3.05	1.19	2.30	14.68	Wheat flour. Brassica arvensis.* Trace arrow root.
7081	3.91	.10	1.54	1.24	4.53	30.11	A leguminous seed, a little wheat flour.
7082	4.44	.05	4.45	.25	2.00	35.15	None.
7083	6.60	1.10	4.10	.73	2.90	18.63	Trace turmeric.
7084	6.45	.30	3.40	.68	2.18	15.47	None.
7085	5.85	.35	4.03	.62	2.25	20.18	Brassica arvensis.*
7086	5.58	.35	5.85	.28	2.18	19.15	Brassica arvensis.* Apparently no attempt to remove seed coats.
7087	5.79	.65	4.00	.68	1.83	12.62	Brassica arvensis.*
7088	6.13	.95	4.43	.58	1.20	23.23	None.
7089	5.60	.40	4.13	.58	1.90	22.05	Trace of red pepper.
7090	5.66	.55	12.15	.18	4.23	10.20	Turmeric, apparently no attempt to remove seed coats.
7091	6.30	.55	4.75	.48	.98	20.47	Brassica arvensis.* Trace wheat starch.
7092	7.03	.73	2.88	.24	4.90	13.20	Trace of starch.
7093	6.13	.53	4.90	.....	1.80	16.55	Brassica arvensis.* Turmeric.
7094	5.68	.40	4.78	.....	1.38	19.15	Brassica arvensis.* Turmeric.
7123	5.63	.99	16.08	32.64	1.34	9.13	None. An excess pepper hulls.†
7124	6.23	1.55	11.85	36.18	1.22	8.88	None. An excess pepper hulls.†
7125	8.00	1.90	14.58	31.28	0.94	7.61	None. An excess pepper hulls.†
7126	5.43	1.30	12.30	37.27	1.04	8.91	None.

* See discussion page 260.

† See discussion page 261.

Brand.	Manufacturer.	Dealer and Town.	Price paid.		Weight of contents.	Station number.
BLACK PEPPER.			cts.	lbs.		
Slade's pepper.	D. & L. Slade Co., Boston, Mass.	John B. Johnson, Portland	7	.23		7127
Royal black pepper.	Dwinell, Wright Co., Boston, Mass.	W. P. Stewart & Co., Waterville	7	.23		7128
Premium pepper	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor	10	.29		7129
Hatchet black pepper.	Twitchell-Champlin Co., Portland, and Boston, Mass.	F. H. Verrill, Portland	8	.23		7130
Premier.	Francis H. Leggett & Co., New York.	James H. Snow & Co., Bangor	10	.24		7131
Absolutely pure black pepper.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland	8	.25		7132
Genuine Malabar	Bennett-Simpson Co., London, Eng.	Wm. Milliken & Co., Portland	10	.24		7133
Shaw's	Dwinell, Wright Co., Boston, Mass.	Geo. C. Shaw Co., Portland	8	.25		7134
Black pepper.	John Bird Co., Rockland, Maine.	Atwood Market Co., Lewiston	6	.23		7135
Bulk pepper.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor				7136
Bulk black pepper.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland				7137
WHITE PEPPER.						
Hatchet brand.	Twitchell-Champlin Co., Portland, and Boston, Mass.	F. H. Verrill, Portland	10	.14		7138
Shaw's.	Dwinell & Wright Co., Boston, Mass.	Geo. C. Shaw Co., Portland	10	.16		7139
Slade's.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor	10	.12		7140
White pepper.	Stickney & Poor, Boston, Mass.	John B. Johnson, Portland	8	.12		7141
White pepper.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Bangor	13	.14		7142
White pepper.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Portland	10	.14		7143
Premium.	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor	12	.26		7144
White pepper.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland	10	.24		7145

Station number.	ASH.		Crude fiber.	Starch.	ETHER EXTRACT.		Foreign matters found.
	Total.	Insoluble in HCl.			Volatile.	Non-volatile.	
	%	%	%	%	%	%	
7127	5.10	.53	15.45	34.55	1.33	8.53	None.
7128	5.55	.62	16.15	35.50	0.99	9.44	None. An excess pepper hulls.*
7129	5.00	.62	13.08	36.72	1.32	9.09	None. An excess pepper hulls.*
7130	4.58	.90	10.93	39.72	0.95	7.73	None.
7131	4.82	.50	14.28	37.54	1.14	8.03	None. An excess pepper hulls.*
7132	5.50	.34	13.93	36.85	1.13	9.67	None. An excess pepper hulls.*
7133	5.40	.48	11.63	39.72	0.95	8.80	None.
7134	5.90	1.20	13.78	36.85	0.95	8.17	None. An excess pepper hulls.*
7135	5.78	1.10	11.95	41.08	1.40	6.95	None. An excess pepper hulls.*
7136	4.78	.68	10.98	37.54	1.68	6.70	None. An excess pepper hulls.*
7137	5.10	.85	12.85	37.27	1.75	7.15	None.
7138	1.00	.05	4.73	58.64	0.44	8.47	None.
7139	1.25	.23	4.23	55.62	0.21	7.94	None.
7140	1.05	.02	3.55	58.10	0.34	8.55	None.
7141	1.38	.28	4.83	55.62	0.61	7.71	Trace ginger.
7142	1.40	.15	3.95	57.82	0.48	6.80	None. Too many pepper hulls.*
7143	1.20	.13	4.90	59.46	0.58	7.14	None. Too many pepper hulls.*
7144	1.25	.20	4.73	55.90	0.76	7.92	None.
7145	1.06	.20	4.95	58.90	0.50	7.87	None.

*See discussion page 261.

Brand.	Manufacturer.	Dealer and town.	Price paid.	Weight of contents.	Station number.
WHITE PEPPER.			cts.	lbs.	
Royal.	Dwinell, Wright Co., Boston, Mass.	W. P. Stewart & Co., Waterville.....	10	.25	7146
Premier brand.	Francis H. Leggitt & Co., New York.	James H. Snow & Co., Bangor.....	12	.25	7147
Bulk white pepper.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor.....	.....	.....	7148
Bulk white pepper.	Stickney & Poor, Boston, Mass.	W. L. Wil-on & Co., .....	.....	.....	7149
Three Crow white pepper.	John Bird Co., Rockland.	H. C. Haskell, Waterville.....	8	.25	7150
CAYENNE OR RED PEPPER.					
Shaw's.	Dwinell, Wright Co., Boston, Mass.	Geo. C. Shaw Co., Portland.....	10	.16	7151
Cayenne pepper.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Bangor.....	13	.21	7152
Cayenne pepper.	Grand Union Tea Co., Brooklyn, N. Y.	Grand Union Tea Co., Portland, Maine.....	10	.20	7153
Slade's.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor.....	10	.12	7154
Slade's.	D. & L. Slade Co., Boston, Mass.	John B. Johnson, Portland.....	8	.12	7155
Hatchet brand.	Twitchell-Champlin Co., Portland and Boston, Mass.	F. H. Verrill, Portland.....	10	.14	7156
Premier brand.	Francis H. Leggitt & Co., New York.	James H. Snow & Co., Bangor.....	12	.24	7157
Premium brand, African.	Stickney & Poor, Boston, Mass.	Fred T. Hall & Co., Bangor.....	12	.28	7158
Cayenne pepper.	Stickney & Poor, Boston, Mass.	W. L. Wilson & Co., Portland.....	10	.13	7159
Bulk cayenne.	D. & L. Slade Co., Boston, Mass.	Staples & Griffin, Bangor.....	.....	.....	7160

Station number.	ASH.		Crude fiber.	Starch.	ETHER EXTRACT.		Foreign matters found.
	Total.	Insoluble in HCl.			Volatile.	Non-volatile.	
	%	%	%	%	%	%	
7146	2.50	.25	4.70	55.62	0.42	7.28	None.
7147	1.38	.08	1.43	61.10	0.35	7.72	None.
7148	1.08	.10	4.15	55.90	0.42	7.55	None.
7149	1.15	.13	5.80	55.35	0.54	7.82	None.
7150	3.78	.40	5.35	54.80	0.40	6.94	Too many pepper hulls.*
7151	6.15	.48	25.08	9.30	3.90	13.73	None.
7152	6.34	.60	23.80	8.99	5.73	13.07	None.
7153	6.03	.25	23.30	6.67	3.58	15.75	None.
7154	5.80	.53	23.83	8.12	4.08	16.25	None.
7155	5.60	.53	23.78	8.70	5.70	14.55	None.
7156	6.35	.45	25.35	6.96	7.28	11.37	None.
7157	7.08	.45	24.90	8.70	3.10	15.60	None.
7158	7.60	.63	20.10	8.70	5.58	15.60	None.
7159	7.13	.48	22.70	6.24	4.30	14.88	None.
7160	6.33	.33	22.48	10.44	6.35	12.80	None.

* See discussion page 261.

VINEGARS.

When alcohol is placed under favorable conditions it takes up oxygen from the air and is converted into acetic acid,—the acid that gives the sour taste to vinegar. Whatever the source of the vinegar, and however it is made, the acetic acid is the same.

Besides acetic acid, vinegar always contains more or less of other substances which vary widely with the source from which the vinegar was made. It is because of these foreign matters, characteristic of vinegar of the same kind, that it is possible for the chemist to quite readily distinguish one variety of vinegar from another. The sour taste of a vinegar is due to its acetic acid, the other flavors are due to foreign matters in solution. The standards which have been adopted for Maine take these other foreign matters into account. The standards for vinegars * will be sent to anyone desiring them.

RESULT OF THE INSPECTION.

Samples of vinegar were taken from the stock of retail dealers in several cities and large towns in the State in the months of September and October, 1906. These vinegars were examined for total acidity, volatile acids, total solids and ash. The nature of the solids and ash were not studied, except in a few special instances. For this reason it may be that an occasional sample of vinegar has been passed as a straight cider vinegar when it was adulterated. Ordinary adulterations would be detected by the methods employed by us. A skillful adulteration might have escaped detection.

The results of the analyses are given in the table on page 279.

While the inspector found the vinegar situation much better than it was a year ago, still the analyses shows that vinegars were on sale in the State that were not correctly branded. Correspondence has developed two things,—great readiness on the part of the manufacturers and wholesalers to meet the requirements of the pure food law; and considerable misunderstanding as to the requirements and how they are to be met. With the present attitude of the trade, both wholesale and retail, there is little reason to doubt that as fast as the requirements of the pure

* Bulletin 135 Maine Station page 249.

food law are understood they will be very generally complied with.

As the vinegar situation seemed to demand specific information relative to the requirements of the law, the enclosed circular, which is here reprinted in substance, was prepared for the wholesale trade to distribute among their customers.

Vinegar Defined.

The word *vinegar* used alone always means pure apple cider vinegar without any additions and containing at least 4 per cent acetic acid.

The words *Cider Vinegar* by themselves always refer to pure apple cider vinegar as defined above.

Wine vinegar always means vinegar made from grape juice. There is practically no wine vinegar used in Maine. The so-called white wine vinegar is a distilled vinegar and not a wine vinegar.

Malt Vinegar is made from barley malt. *Sugar Vinegar* is made from cane sugar products and *glucose vinegar* from starch sugar.

The above are undistilled vinegars made by fermentation.

Distilled vinegar is the product of fermentation of dilute distilled alcohol from any source. Cider vinegar and distilled vinegar are the kinds most commonly used in Maine.

Vinegar of any kind must contain at least 4 per cent acetic acid to be up to the standard required by the pure food law.

The word *pure* cannot be legally used if a vinegar is not up to standard or contains any added foreign material.

In case a vinegar is colored by the addition of a solution of caramel (burnt sugar), the word "colored" will be construed as covering that fact. If any other kind of coloring material be used, the kind and amount per gallon must be stated.

Branding Vinegar.

Strictly pure apple cider vinegar containing not less than 4 per cent acetic acid does not require a label. All other kinds of vinegar must be "plainly labeled, branded or tagged so as to show the exact character thereof."

In order to be "plainly" branded the letters, if stencilled, should not be less than $\frac{3}{4}$ of an inch high, and applied with a waterproof ink to a clean painted surface. A printed label could be made up of somewhat smaller letters.

In case an apple cider vinegar carries any addition or is below strength it must be so labeled. For instance if the vinegar was considered too light in color and caramel (burnt sugar) is added the label must state this fact, e. g. "Apple Cider Vinegar, Colored" would be all right. If it is below 4 per cent acetic acid the label must state this fact, e. g. "Apple Cider Vinegar, $3\frac{1}{2}$ per cent acetic acid." The word *pure* cannot be used even if the vinegar is made from cider and is below the standard (4) per cent or is colored.

An uncolored distilled vinegar may be labeled grain vinegar, spirit vinegar, distilled vinegar, white vinegar or pickling vinegar.

A colored distilled vinegar may be labeled as above but the word colored must appear, e. g. Grain vinegar, colored, Colored distilled vinegar, etc.

If any kind of vinegar carries less than 4 per cent acetic acid, that fact must be stated, e. g. White distilled vinegar 3 per cent acetic acid, or Colored grain vinegar 3 per cent acetic acid, etc.

A distilled vinegar up to the standard strength and not colored may be labeled pure, thus Pure grain vinegar is in accord with the law. An artificially colored vinegar cannot be labeled pure.

Retailers must so place the barrel from which they are selling that the brand can be readily seen and read.

If customers will take pains to read the brand upon the package they will know much better what kind of vinegar they are using.

While not required by the law, it is desirable that the name of the manufacturer or jobber be stated.

Description and results of analyses of samples of different kinds of vinegars collected in Maine in the fall of 1906.

Station number.	Manufacturer and dealer.*	Cost per gallon.	Total acids.	Volatile acids.	Total solids.	Ash.
	CIDER VINEGARS.	cts	%	%	%	%
7420	H. E. Bean, Biddeford. A country cider vinegar.....	25	5.45	5.34	1.72	.27
7426	A. H. Black, Sidney. E. Locke, Augusta	25	5.87	5.86	1.85	.35
7437	A. H. Black, Sidney. G. E. Barrows, Waterville.....	25	7.20	7.20	1.74	.32
7422	Jos. Carrier, Biddeford. A country cider vinegar.....	25	5.16	5.16	3.19	.48
7478	E. E. Clifford & Co., Portland. Neally & Miller, Lewiston.....	25	5.11	5.11	1.93	.30
7455	C. F. Dearth, Foxcroft. Fred T. Hall & Co., Bangor.....	30	6.33	6.20	3.20	.21
7390	John Dingley & Co., Auburn. A country cider vinegar.....	25	6.55	6.14	3.02	.39
7406	Duffy Cider Co., Rochester, N. Y. O. C. Elwell, Portland.....	25	5.32	5.26	2.57	.29
7430	Duffy Cider Co., Rochester, N. Y. Percival Bros., Augusta	25	5.07	5.04	2.48	.30
7434	S. R. Dyer & Co., Kingston, N. Y. A. W. Peaslee, Gardiner	25	6.00	6.00	2.50	.28
7480	Chas. Haywood & Co., Bangor. McGary Bros., Houlton.....	25	5.28	5.16	3.01	.29
7395	H. J. Heinz Co., Pittsburg, Pa. Atwood Market Co., Lewiston.....	25	6.66	6.52	2.60	.34
7411	H. J. Heinz Co., Pittsburg, Pa. W. L. Wilson & Co., Portland	30	6.32	6.22	2.04	.28
7429	Fred Hewins, East Winthrop. C. W. Church, Augusta.....	25	6.04	5.98	3.33	.51
7459	R. E. Hovey & Co., Bangor	25	7.60	7.60	2.29	.41
7391	G. R. Hunnewell, Danville Junction. A. M. Penley & Son, Auburn	25	6.52	6.48	1.73	.28
7440	W. S. Hunnewell, China. Geo. A. Kenniston, Waterville.....	25	7.31	7.28	1.90	.33
7438	J. A. Jenkins, Winslow. C. E. Matthews, Waterville	25	6.21	6.16	1.82	.36
7436	B. F. Jepson, China. E. M. Jepson, Waterville. A poorly made straight cider vinegar..	25	3.58	3.54	2.14	.40
7447	Alonzo McIntyre, Skowhegan. Geo. Simpson, Skowhegan. A poorly made straight cider vinegar..	25	3.24	3.14	3.19	1.16
7407	Morrill & Ross, Portland	25	6.42	6.42	2.53	.27

* When two names are given, the first is that of the manufacturer.

Description and results of analyses of samples of different kinds of vinegars collected in Maine in the fall of 1906.

Station Number.	Manufacturer and Dealer.*	Cost per gallon.	Total acids.	Volatile acids.	Total solids.	Ash.
	CIDER VINEGARS.	cts.	%	%	%	%
7419	Jos. Menard, Biddeford. A country cider vinegar; a poorly made vinegar which Mr. Menard withdrew from sale.....	20	2.86	2.86	2.60	.35
7334	C. N. Penney, Auburn.....	25	3.98	3.98	2.57	.33
7408	J. F. Pillsbury, Lewiston. Geo. C. Shaw Co., Portland.....	25	6.26	6.10	2.89	.38
7432	R. C. Plaisted, Gardiner. F. N. Noyes, Gardiner.....	25	5.36	5.36	1.53	.52
7435	R. C. Plaisted, Gardiner. F. M. Moores, Gardiner.....	25	4.49	4.48	1.46	.43
7417	—Ross, Clark's Mills. Joel Bean & Son, Biddeford. A poorly made cider vinegar.	25	3.39	3.32	2.47	.38
7433	A. M. Sawyer, West Gardiner. Wm. Wood & Son Gardiner.....	25	7.52	7.52	1.57	.43
7414	Geo. C. Shaw Co., Portland. A country cider vinegar.....	25	4.47	4.47	2.43	.28
7396	John Sturgis,—— A. P. Conant & Co., Lewiston.....	25	5.86	5.84	2.27	.35
7425	J. O. Sullivan & Sons, Biddeford. Manufacturer unknown,—bought in Boston.....	25	6.25	6.24	3.14	.42
7405	Twitchell-Champlin Co., Portland. Scannell & Roche, Lewiston.....	25	5.92	5.78	4.31	.45
7410	A. G. Tufts, New Gloucester. J. W. Deering & Son, Portland.....	25	5.06	5.04	1.47	.32
7449	John Watson Co., Houlton. Chas. H. Wilson, Houlton.....	25	5.15	5.08	2.24	.23
7424	C. A. Weston Co., Portland. Murphy Bros., Biddeford,.....	25	4.90	4.80	2.16	.40
7412	W. L. Wilson & Co., Portland. A country cider vinegar.....	25	5.39	4.99	3.44	.36
7445	Geo. Wing, Skowhegan. Geo. S. Webb, Skowhegan.....	25	4.63	4.56	2.53	.40
7457	Chas. York & Co., Bangor.....	25	5.20	5.20	2.32	.33
	MALT VINEGARS.					
7392	H. J. Heinz Co., Pittsburg, Pa. Olfene & Holmes, Auburn.....	25	5.84	5.68	1.60	.17
7409	H. J. Heinz Co., Pittsburg, Pa. Geo. C. Shaw Co., Portland.....	30	7.77	7.32	2.28	.25

* When two names are given, the first is that of the manufacturer.

Description and results of analyses of samples of different kinds of vinegars collected in Maine in the fall of 1906.

Station number.	Manufacturer and dealer.*	Cost per gallon.	Total acids.	Volatile acids.	Total solids.	Ash.
	MALT VINEGAR.	cts.	%	%	%	%
7454	H. J. Heinz Co., Pittsburg, Pa. J. H. Snow Co, Bangor.....	30	6.01	5.78	2.14	.28
	DISTILLED VINEGARS NOT COLORED.					
7446	Anderson & Edwards, Smithville, N. Y. Geo. Simpson, Skowhegan.....	20	3.72	3.72	.14	.02
7398	Josiah Bowker, Lewiston. Manufacturer not known.....	25	4.50	4.44	.13	.06
7421	Jos. Carrier, Biddeford. Manufacturer not known.....	25	5.28	5.26	.12	.02
7401	E. E. Clifford & Co., Portland. John LaCroix, Lewiston.....	20	3.56	3.56	.13	.04
7415	E. E. Clifford & Co., Portland. Biddeford Grocery Co, Biddeford.....	20	3.94	3.90	.13	.05
7399	C. H. Cloutier & Co., Lewiston. Manufacturer not known.....	25	5.41	5.38	.19	.04
7428	Haskell, Adams Co., Boston. Merrill Bros., Augusta.....	25	6.22	6.22	.19	.05
7393	H. J. Heinz Co., Pittsburg, Pa. C. M. Penney, Auburn.....	25	6.66	6.61	.13	.02
7418	H. J. Heinz Co., Pittsburg, Pa. Jos. Menard, Biddeford.....	25	6.42	6.42	.19	.02
7456	H. J. Heinz Co., Pittsburg, Pa. Fred T. Hall & Co., Bangor.....	—	6.19	6.18	.25	.01
7458	H. J. Heinz Co, Pittsburg, Pa..... R. E. Hovey & Co., Bangor.....	30	6.68	6.66	.19	.05
7427	E. Locke, Augusta. Manufacturer not known.....	25	6.57	6.56	.31	.03
7416	S. C. Messier, Biddeford. Manufacturer not known.....	20	2.98	2.98	.15	.04
7423	Murphy Bros., Biddeford. Manufacturer not known.....	—	3.26	3.26	.16	.04
7402	Neally & Miller, Lewiston. Manufacturer not known.....	20	4.28	4.24	.15	.05
7441	Alex Quirion, Waterville. Manufacturer not known.....	25	6.24	6.22	.21	.04
7448	John Watson Co., Houlton. Chas. F. Wilson, Houlton.....	25	7.54	7.54	.23	.07

* When two names are given, the first is that of the manufacturer.

Description and results of analyses of samples of different kinds of vinegars collected in Maine in the fall of 1906.

Station number.	Manufacturer and dealer.*	Cost per gallon.	Total acids.	Volatile acids.	Total solids.	Ash.
	DISTILLED VINEGARS, COLORED.	cts.	%	%	%	%
7397	Josiah Bowker, Lewiston. Manufacturer not known.....	20	3.71	3.70	.55	.35
7403	E. E. Clifford & Co., Portland. Neally & Miller, Lewiston.....	20	4.01	3.98	.26	.67
7413	E. E. Clifford & Co., Portland. Foster Co., Portland.....	25	4.21	4.20	.18	.02
7431	E. E. Clifford & Co., Portland..... Pomerleau & Haerd Co., Augusta.....	20	4.24	4.18	.22	.05
7400	C. H. Cloutier & Co., Lewiston. Manufacturer not known.....	25	5.66	5.66	.33	.06
7450	A. H. Fogg Co., Houlton. E. A. Gillin & Co., Houlton.....	25	4.97	4.96	.26	.08
7444	Fuller-Holway Co., Augusta. O. G. Pelletier, Waterville.....	25	5.02	5.02	.29	.07
7439	H. C. Haskell, Waterville. Manufacturer not known.....	25	5.16	5.16	.60	.27
7453	A. W. Joy, Bangor. Manufacturer not known.....	25	4.20	4.20	.53	.14
7404	Merrill & Crowell, Lewiston. Manufacturer not known.....	—	4.12	4.12	.20	.02
7443	N. J. Morin, Waterville. Manufacturer not known... ..	25	5.56	5.56	.42	.15
7442	Alex Quirion, Waterville†.....	20	1.42	1.20	.94	.27
7389	J. P. Vickery & Co., East Auburn. J. W. Peables, Auburn.....	25	5.46	5.40	.13	.03
7451	John Watson Co., Houlton. McGary Brothers, Houlton.....	25	4.88	4.88	.28	.01

* When two names are given, the first is that of the manufacturer.

† There was only a small amount of this vinegar; it was in a barrel labeled from Haskell & Adams Co., Boston. Apparently Mr. Quirion bought a syrup vinegar and after it was largely sold out, added hard cider to it. The goods were withdrawn from sale.

FREE ANALYSIS OF FEEDS, FOODS, FERTILIZERS, AND SEEDS.

The Station takes pains to obtain for analysis samples of all brands of fertilizers and feeding stuffs coming under the law. It also draws samples of agricultural seeds and foods in the hands of dealers. The co-operation of dealers and consumers is, however, essential for the full and timely protection of their interests.

Foods. Dealers and consumers are invited to send by prepaid express original and unbroken packages of food materials on sale in Maine of whose purity they are for any reasons suspicious. As prompt free analysis will be made of such samples as circumstances will allow.

Feeding Stuffs. The Station will promptly analyze samples of feeding stuffs sold in Maine taken in accordance with directions which will be furnished on application. The results will be reported without charge to interested parties. This applies to dealers and consumers alike.

Commercial Fertilizers. It is difficult to draw accurate samples of commercial fertilizers. On this account it is only in rare instances that the Station undertakes analyses of fertilizers other than the samples collected by its representatives. In case there is special reason for an examination, the Station invites correspondence on the subject.

Agricultural Seeds. Samples of agricultural seeds on sale in Maine, taken in accordance with directions which can be obtained on application to the Station, will be examined as promptly as possible and the results reported free of charge.

In all cases samples should be accompanied by a full description of the goods, including the name and address of the dealer and the sender. Small samples other than liquids can be forwarded by mail. Others should be forwarded by express, charges prepaid. Both mail and express matter should be addressed to the

AGRICULTURAL EXPERIMENT STATION,
Orono, Maine.

FOOD LEGISLATION.

The State Law regulating the sale of food, and the National Law regulating Interstate commerce in food, are practically the same. The standards adopted are also the same and the rulings of the Secretary of Agriculture will govern, so far as may be, the execution of the State Law.

MAINE. The text of the Pure Food Law and the Food Standards adopted for Maine are given in Bulletin 135, a copy of which will be mailed on application to this Station.

NATIONAL. The text of the National Law regulating interstate traffic in food and drugs, and rulings adopted for its enforcement are given in Circular 21 of the Office of the Secretary, U. S. Dept. of Agriculture; and the Food Standards as adopted by the Secretary of Agriculture, are given in Circular 19 of the Office of the Secretary. Copies of these publications can be had on application to the Secretary of Agriculture, Washington, D. C.

Bulletin 135,—Pure Food Law and Standards was mailed only to libraries. To others on the Station mailing list it will be forwarded on request.